



The Contributions of Technology

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although slightly different. The amounts of the materials which may be obtained differ tremendously and appear to depend upon the host and the virus or virus strain. The materials appear to be reasonably homogeneous when carefully prepared. Many different types of experiments have demonstrated a direct correlation between the integrity of structure of a given material and its virus activity. Because of this and because it has not been found possible to separate virus activity from these materials, there is reason to believe that they are the viruses. They appear to have the properties of molecules and in addition the property of virus activity, a kind of property usually assigned to organisms and one which has not heretofore been ascribed to molecules. Some may wish to consider that there is a sharp line of division between molecules and organisms and that viruses belong wholly in one or the other of these two groups. Others may wish to retain the sharp line of division but place some viruses in one group and other viruses in the second

group. However, to a chemist it appears preferable to consider that virus activity may be a property of molecules, that there may be no sharp line of division between molecules and organisms, and that the viruses may provide the transition between the two. One virus has been inactivated and reactivated, and some idea gained of the accompanying change in structure. Studies on the elementary composition, the amino acid distribution, the amount and kind of nucleic acid, the immunological reactions, the effect of different enzymes, the pH and thermal stability ranges, and the effect of many different kinds of chemicals have been completed on some of the viruses. Extensive studies of the physical properties have also been made and the existence of long range forces between molecules has been demonstrated. There is every reason to believe that the extension of these studies will eventually result in the solution of the more fundamental problems related to the viruses, such as the nature of their origin, reproduction and mutation.

THE CONTRIBUTIONS OF TECHNOLOGY

SCIENTISTS, engineers and inventors have created the so-called technological age. We believe that our work and its results are predominantly beneficial to mankind. Some timid souls are frightened at the pace with which technological achievements have come; some see our creations being put to destructive use in warfare and feel that man should not be allowed to have such powerful tools; still others worry about the unemployment that frequently results from introduction of labor-saving machinery or from replacement of one product by a superior one. We technologists, while admitting both accidental and premeditated harmful effects of science, nevertheless see the gains from technology as far outweighing the losses, and we have sure faith in the social value of our efforts.

We see such advances as improved homes, better wages, shorter hours of work, far less disease and suffering, free time for education during youth and for vacations during working years, and, finally, pensions in our old age. None of these happy situations ever existed in the history of the world for the masses of any

people until science and its applications made them possible. Just for one illustration consider this tremendous fact: It has been estimated that during the past three hundred years the population of the earth has increased three times as much as in all the preceding hundreds of thousands of years of man's life on this earth. Knowledge of medicine, disease and health; more fruitful methods of agriculture; methods of fast communication and transportation have combined with other technological factors to push back the starvation, epidemics, infant mortality, floods and other hazards which were continually limiting the earth's population. Whether we like the fact or not, about 1,500,000,000 people are alive to-day who would be dead or unborn except for modern technological progress. Since that figure includes two or three out of every four persons among us, I imagine that if we were to vote on the subject, most of us would be in favor of keeping and further extending the technological progress that has made these things possible.—*Karl T. Compton, Technology Review, June, 1941.*